



Australian Government

Australian Centre for  
International Agricultural Research



# ACIAR POLICY BRIEF

Research findings with policy implications

## SUSTAINABLE FISHERIES AND IRRIGATION EXPANSION IN LAO PDR

Incorporating fish passage into sustainable development practices and policy in Lao PDR



## ACIAR POLICY BRIEF: SUSTAINABLE FISHERIES AND IRRIGATION EXPANSION IN LAO PDR

The policy brief summarizes findings, outcomes and recommendations from several research projects on fish passage implemented by a consortium from Lao PDR and Australia, and is provided at the request of Lao PDR's Ministry of Agriculture and Forestry

### SECTOR SNAPSHOT

- Freshwater fish and other aquatic animals provide approximately 50% of the animal protein consumed in Lao PDR
- The freshwater fish catch in the Lower Mekong Basin is important for nutrition and livelihoods (approximately 2% of the global fisheries catch comes from the Lower Mekong Basin)
- Rice production is similarly important, accounting for 80% of agricultural production in Lao PDR
- Most rice production occurs on floodplains, as these areas contain the most fertile land
- Floodplains also contain extensive wetlands which are essential for fish production
- Water control devices (such as weirs and flood control gates) associated with irrigation schemes for rice production are stopping fish from accessing wetlands
- These water control structures constrain fisheries production
- Without intervention, further declines in the fisheries resource will occur in the future
- A program of work funded by the Australian Centre for International Agricultural Research (ACIAR), has demonstrated that engineering solutions can enable fish to move both upstream and downstream of low-head (less than 6 metres) water control structures, improving fisheries production
- There is substantial interest from donor bodies and developers to expand fishway construction to complement irrigation infrastructure upgrades
- There is a clear policy need to recognize the effectiveness of fishways as a mechanism to generate win-win outcomes where healthy fisheries can co-exist with irrigation expansion activities



## SUMMARY

The regional irrigation industry is rapidly expanding in Lao PDR. Irrigation infrastructure, while important for generating income from rice production in drying landscapes, can adversely impact upon fish; a major source of nutrition and income for regional communities. Australian researchers deployed technology that can significantly reduce

fisheries impacts and generate win-win outcomes for irrigation and fisheries. Regional donor bodies are keen to invest in these solutions but are seeking guidance to ensure programs are implemented effectively. This policy brief sets out key actions that could substantially benefit both fishers, farmers and communities if implemented in a strategic manner.

## INTRODUCTION

The freshwater fisheries in Lao PDR are economically significant, being important for livelihoods and food security. The average Lao citizen consumes 25 kg of fish per year; almost 8 times the amount of pork, beef or chicken. Fish are an essential source of protein, calcium and micronutrients for adults and children. Preserving fisheries productivity is therefore critical to meet poverty reduction targets. But the majority of Mekong fish are migratory, requiring access to spawning, feeding and nursery habitat at various stages of their life cycle. However, significant river development activities, such as irrigation expansion and hydropower development, threaten the fisheries resource base.

Engineering solutions exist that can minimize fisheries-related impacts. However, few have been developed in the local (Lao) context. Absence of such information has led to river development advancing without due consideration of fisheries impacts. Recent surveys have identified that much irrigation development in Lao PDR is not registered with the central government. Several thousand irrigation schemes exist in some catchments, and

each obstruct fish migration to some degree. In many areas, farmers have reported reduced fisheries productivity upstream of areas where irrigation schemes have been developed. These observations are largely because the irrigation schemes block access to essential fish habitat and fish populations (and hence protein sources for people) are declining in response.

A program of work funded by ACIAR has demonstrated that fishways offer a suitable solution to improve fisheries productivity in areas impacted by irrigation infrastructure. Fishways allow fish to pass through, or around, a migration barrier. They function much like a set of stairs. Many fish, including large catfish and other important food species, require access to nursery areas blocked by irrigation infrastructure, in order to survive juvenile stages. Fishways have now been demonstrated to provide this important access, delivering measurable fishery benefits at a local scale. These successes call for the development of management initiatives, policy adjustments and a broader development program that will benefit fisheries on a broader scale.

## WHAT IS A FISHWAY?

A fishway is a channel which allows fish to pass through or around a migration barrier. Their function is much like a set of stairs. They may be technical in design (as in the image below), designed to replicate a natural, sloping water course.



Cone-type fishway at a low-head weir in Queensland, Australia. Photo: Tim Marsden

The conical structures in the fishway break the flow of water, changing what would otherwise be a uniform flow of high velocity water into channels of varying flow rates. Fish seek out areas of low velocity, through which they can successfully swim upstream. The short cones cater for fish passage during low water levels, while the higher cones work best when the water level is elevated. The large barriers at the sides create areas of static water, which the fish use as resting areas prior to moving further upstream.

*The fishway has been great for my community. We are now catching valuable catfish in the reservoir for the first time in over 20 years—Mr Vone, Pak Peung Villager*

## POLICY CONSIDERATIONS

**1. Strengthen the food security and conservation outcomes of the current irrigation, energy and fisheries laws of Lao PDR by integrating the requirement to protect fish passage.**

A key factor in the construction of suitable fishways in other areas of the world is strong legislation. All Australian and American states and territories have legislated a requirement to have fish passage installed at any new river infrastructure projects and at any projects scheduled for replacement or modification. Legislation has created a culture of compliance where any new works ensure fish passage is adequately catered for. No such policy exists in Lao PDR. A fish passage provision was suggested for the updated Lao irrigation law, but was removed from the final draft. Lao Fisheries and Energy Law provides no formal mechanism to require fish passage at either large or small projects. The development of such legislation would ensure that donor bodies and developers implementing both major and minor works programs meet environmental requirements which in turn will protect the fisheries resource base.

**2. Consider fish passage upfront in policy, guideline and budget discussions related to new infrastructures and upgrades of existing ones.**

Development agencies, such as the World Bank and the Asian Development Bank, are embarking on infrastructure construction programs. Hundreds of kilometers of new irrigation pipes, canals and diversions are planned over the next decade. Further, ageing infrastructure is being replaced and modernized. It is important that new and renovation activities consider incorporating fish passage into design and construction. It is far cheaper, and designs are more effective, if fishways are included in the early stages of planning at a new structure or when old ones are being replaced.

**3. Support applied policy research to sustain substantial development outcomes on food security**

The results of the fishways program funded by ACIAR has already led to wider uptake in Lao PDR. These opportunities culminated in a \$US2M investment by World Bank into new fishways being constructed in the Xe Bang Fei catchment. Preliminary discussions are also underway with the Asian Development Bank which is looking to upgrade water regulators in Northern Laos, and include fishways as part of an existing ADB-DFAT alliance. It is essential that officials with on-ground experience in fishway construction, and the relevant local procurement processes, feature prominently in these activities. The existing Australian and Lao collaboration can play a leading role in this process.

**4. Lead critical information sharing on new technological solutions necessary to ensure food security**

Management and funding agencies often fail to recognize that tangible solutions exist for fish passage at low head structures. Also, there is no single person or organisation advocating for the need to construct fishways when works programs are discussed in Lao PDR. There are two ways to tackle these issues. Firstly, a focused communications campaign in Lao language could specifically target irrigation scheme developers. Secondly, the establishment of a Fish Passage Reference group; a one-stop shop for all matters regarding fishway design could be established. In Australia, such a group was formed in 2002, and for many years it acted as a source of advice, compliance and verification on all matters regarding fish passage. The existence of the group was made known to developers and river operators and its services were actively sought on a range of development issues.

## POLICY CONSIDERATIONS (CONT'D)

Following its formation, it oversaw the satisfactory construction of hundreds of fishways in Australia. Resourcing the establishment of a similar group in Lao PDR—endorsed by governments and recognized by donor bodies and developers—would provide a mechanism to ensure fish passage is considered from the outset.

### 5. Promote a conducive business partnership environment that ensures professional advice to developers and the Lao Government

Australian businesses, consultants and SMEs have featured prominently in fish passage development in Lao PDR. Consultants from Victoria (Kingfisher Research), New South Wales (Fishway Consulting Services) and Queensland (Australasian Fish Passage Services) all provided professional advice

to the Lao government and key industry agencies on fish passage. The work also aligns with the national science and research priorities. Specifically, fishway construction is considered an advanced manufacturing technology. AWMA Solutions, an irrigation gate manufacturer in Victoria constructed and installed state-of-the-art technology at the Pak Peung regulator. KarlTek Pty Ltd, a radio frequency identification manufacturer specializing in fish tracking, is installing an advanced monitoring tool using Australian patented technology. Australian business involvement, given their global expertise and ownership of crucial patents, will be important to the development of quality fish passages in the lower Mekong region. Such companies can provide valuable experience and proven expertise for fishway and irrigation development in Lao PDR.

## KEY MESSAGES

- Without intervention, fisheries in Lao PDR are under substantial threat from irrigation development
- The rapid rate of irrigation expansion offers the opportunity to have fish passage considered now, as new structures are built and old ones are modernised
- The ability to ensure fish passage is considered as part of works programs would be enhanced through the establishment of robust legislation and a national oversight group
- ACIAR-funded research has provided a suite of mitigation options that can be immediately applied to new and existing works projects being planned by donors bodies such as the ADB and World Bank
- Australian researchers and businesses have the necessary skills and on-ground experience to guide Lao agencies through the initial planning stages of such programs
- If implemented in a strategic and stepwise manner, win-win outcomes can be generated that maintain irrigation potential and enhance fisheries production.

## CONCLUSION

The sustainability of freshwater fisheries is challenged by a number of development-related pressures. The goal of poverty reduction cannot be achieved if fisheries resources, the main source of animal protein and micronutrients in Lao PDR, decline. The increasing knowledge base on the effectiveness of fish passage technology offers opportunities for win-win outcomes, resulting in improved fisheries production on flood-plains as well as more irrigation. The ultimate outcomes will be increased fisheries and agricultural production, more sustainable exploitation of the inland fish resource, and equitable benefit sharing.

A series of issues, promising options and priorities for action include:

1. Promoting existence of a demonstration site in Pak Peung (Bolikhamxay province)
2. Supporting World Bank and Asian Development Bank to incorporate fishways as part of irrigation development programs
3. Mandating a requirement for fishways into new legislation;
4. Promoting Lao officials to act as regional champions for fish passage issues;
5. Documenting the success of existing infrastructure, and proactively seeking opportunities to develop new and improved designs
6. Establish a fish passage reference group to provide well founded local advice on fish passage to developers, NGO's and Government organisations

## FRESHWATER FISHERIES STATISTICS:

**2%** of the global annual fisheries harvest comes from the Mekong catchment;

**1,200** species in the Mekong catchment (481 from Lao PDR)

**25kg** is the average amount of fish consumed per person per year in Lao PDR

**170,000 tonnes** of fish are consumed in Lao PDR each year

**86%** of fish in Lao PDR are migratory

## ACKNOWLEDGEMENTS

Chris Barlow (ACIAR); Lee Baumgartner (CSU); Oudom Phonekhampheng and Garry Thorncraft (National University of Laos); Douangkham Singhanouvong and Khampheng Homsombath (Living Aquatic Resources Research Centre); Tim Marsden (Australasian Fish Passage Services); Craig Boys (NSW Department of Primary Industries)

## LAO PDR FISHWAYS PARTNERSHIP



Australasian Fish Passage Services



Department of  
Primary Industries



Institute for Land,  
Water and Society  
Charles Sturt University

